

HOWARD SOIL CONSERVATION DISTRICT

CRITERIA FOR PERMANENT POND PLAN PREPARATION

The following are the minimum acceptable criteria to be adhered to in the preparation of permanent pond plans or designs to be submitted to the Howard Soil Conservation District for review and approval. Note that the Howard County Department of Public Works reserves the right to enforce more stringent criteria and should be consulted as to their additional requirements. See Howard County Design Manual Vol. 1, "Storm Drainage".

The criteria apply to single or multi-purpose structures which are to be newly constructed; to older structures which are to be retained as a viable component of a subdivision plan or for the conversion of temporary sediment basins into permanent pond. Ponds that are exempt per MD-378 do not require HSCD approval. However their outlets must be non-erosive, per Sediment Control criteria.

The following describes the basic information sought by the HSCD to assure that the contractor or builder has all the information needed to construct a safe, durable and quality pond. It also serves to illustrate all the key features of a planned pond construction so that the designer and reviewer may fully understand the implications of the final finished product with respect to common sense, purpose, and safety.

The following checklist does not preclude compliance with any design or construction specifications construction specifications contained within Code 378, which must be fully understood and familiar to the designer. There are many additional requirements specified within Code 378, especially as ponds and their drainage areas become large.

Note that these checklists are under constant revision (see date on bottom). Revisions will be formally announced within the periodic HSCD Newsletters and incorporated to make a new, updated checklist. Keep in touch.

General – These conditions apply to all plans or designs submitted:

1. All plans and specifications for pond designs submitted for review and approval by the Howard District must conform with the most recent Natural Resources Conservation Service Standard and Specifications for Ponds, Practice Code 378 and revisions thereto. Drafting and computations shall be neat, orderly and sufficiently legible to assure timely review and interpretation. Designs not meeting these criteria will be returned to the preparing engineer for re-computation, redesign, or redrafting as required.
2. All pond plans are to be based upon an acceptable downstream hazard analysis which identifies the hazard classification for the proposed structure. The national NRCS Hazard Classification system as described in 510.21 of Subpart C – Dams, of the NRCS National Engineering Manual and as supplemented by the current Maryland NRCS Standard and Specifications for Ponds (Code 378) provides the accepted methodology for this analysis. The resultant pond design is to be based upon the criteria for the assigned hazard class as specified in the Maryland NRCS Standard and Specification for Ponds (Code 378).
3. For public safety, the Howard District will require that pond designs be based on ultimate future hydrologic conditions of the entire watershed during the 100-year runoff event rather than present conditions. Routing shall begin ($S=0$, $Q=0$) no lower than the first non-clogging opening (no ≤ 8 " dimensions) elevation. Future hydrologic conditions shall be based on land uses as specified in the Howard County General Plan in effect at the time.

4. Plan review and approval assistance will be furnished on the premise that the pond will be constructed in strict compliance with the approved plans and specifications, or approved modifications; and that all construction, reconstruction, or repair of ponds will comply with current Maryland Water Resources Administration Law and County and District regulations governing such work.
5. "As-Built" plans shall be required for all ponds. Plans show "red-lined" construction elevations, cross section and profiles on blue-line copy of the approved design and shall be accompanied by a construction certification signed and sealed by the registered professional engineer who designed and supervised construction. "As-Built" plans shall be provided to the Howard District by the landowner within 30 days after completion of construction.

Non-compliance with items 4 and 5 above shall be cause for withdrawal of District assistance and approval, notification to the MDE, Maryland Water Resources Administration of the action taken.

6. If the feasibility of a site is questionable due to the presented character of the soils, adequacy of the water supply, presence of rocks, or other marginal conditions, the District will inform the landowner and engineer of the construction risk factors involved and how they may affect feasibility and safety aspects of the structure. On such sites, the decision to provide further plan review assistance will be made by the District after consultation with the landowner and the engineer.
7. The scope of the plan is to be clearly delineated and identified in the Title Block.
8. Plans are to be legible and include: appropriate scales, north arrow, vicinity map, road identification, stream identification, and standard symbols for sediment control practices to be used during construction.
9. Developer's (owner's) name, address and phone number is to be shown.
10. Engineer's name, address and phone number is to be shown.
11. Property lines and names of adjacent property owners are to be shown.
12. Existing features, and existing and proposed contour lines based on all grading changes are to be shown (contours are to be labeled and spot elevations are to be shown).
13. Topographic data is to be sufficiently adequate to show conditions of the site, adjacent properties and downstream from the extreme downstream end of the plunge pool (below the barrel outlet) a minimum of 100 ft., and any pond/structures upstream of the site.
14. The 100-year floodplain delineation, based on ultimate development of the watershed is to be shown.
15. Existing and/or proposed improvements (buildings, walls, parking lots, etc.) in the immediate vicinity of the proposed pond or downstream from it are to be shown.
16. Existing and/or proposed utilities (surface and subsurface) are to be shown, properly identified and described. The description should address all appropriate considerations regarding the

condition of the pipes, wires, etc.; hazards associated; and the precautions which are required for working in the area as regards the specified utility. A specified note is required on all plans

17. to notify "Miss Utility" at 410-792-2401 or 1-800257-777 at least 48 hours before beginning the construction.
18. The drainage area for the proposed pond and all sub-areas which are controlled by piping, swales, natural channels or upstream ponds are to be indicated on an appropriate map and described.
19. Borrow or spoil area is to be shown and cut and fill balance is to be indicated.
20. The developer (owner) is responsible for the acquisition and establishment of recordation in the Land Records of Howard County of all easements, rights, and/or rights of way (and proof of same) that may be required for the discharge of runoff from the barrel, weir structure, and emergency spillway which flow onto or across adjacent or downstream properties.
21. The developer (owner) is responsible for the acquisition, establishment, and recordation in the Land Records of Howard County of all easements, rights, and/or rights of way that may be required for grading and/or work on adjacent properties. In cases where a pond is to be located on two or more adjoining properties, under different ownership, the District shall require the property owners to sign an agreement stipulating construction and maintenance responsibilities for the pond prior to review and approval assistance. This agreement shall be filed in the District office and recorded in the Land Records of Howard County.
22. A maintenance agreement covering all aspects of maintenance of the pond shall be signed by the party of parties with maintenance responsibility before review and approval will be granted.
23. Any pond plan designed and approved as part of a flood control or stormwater management facility under requirements of the Howard Soil Conservation District and/or other public agencies shall require that the pond area, including embankment, outlet structures, and flood pool areas to be recorded via applicable covenants, deed restrictions, rights-of-way or easement in the official land records of Howard County, setting forth the provisions for maintenance, and properly binding present and future owners to such covenants.
24. Because we are nearly the last step in the review process, we may be requesting, when applicable, copies of DNR, Army Corps, WRA, MDE, and Howard County documentation to be sure they have been notified as to any disturbances or alterations regarding wetlands, floodplain or streams which often accompany pond sites. Be sure their conditions are met within the plan or else we may not grant approval.
25. Provide point-by-point response to HSCD comments following the first submission.
26. **WARNING:** Be sure all plans, profiles, details, notes backup computations and reports match.

HSCD CRITERIA FOR POND DESIGN REPORTS AND SUPPORT DATA

- I. Report is typed, neat, and legible on 8-1/2" x 11", bound paper.
- II. Title sheet, states project name, number, engineer seal and signature, and date/revision.
- III. Completed MD-14 (assume "normal pool" is 10 year design elevation for SWM ponds).
- IV. Table of Contents.
- V. List of Figures and Tables.
- VI. **BODY OF REPORT**
 - i) **Introduction:** Includes description of project, vicinity map, description of project, vicinity map, description of receiving land/waters, zoning classification, soils present, land cover, purpose of pond, other ponds in vicinity and hazard classification and justification.
 - ii) **Methodology Used:** Describe sources of information and analyses, equations used, hydrologic and hydraulic models used (e.g. TR-20, TR-55, weir, orifice, and breach equations and their coefficients, etc.), tail water analysis, hazard reach determinations, soil boring analysis, dam breach analysis (if required as determined by Hazard Reach Analysis), emergency spillway (earth weir) based on EFM 11-54.1 through 11-54.11.
 - iii) **Figures & Tables** (may be distributed within body of report at appropriate locations): Soil Map (1" = 1320'), Vicinity Map (1" = 2000'), Zoning (General Plan) Map, Aerial Photograph (optional), Stage/Discharge Performance (Graph or Table), Stage/Storage Performance (Graph or Table), soil borings on plan and profile of pond, cross sections for TR-20 reaches or tailwater analyses.
 - iv) **Analysis:** Includes hydrologic model (TR-20) schematic; summary of RCN, T, and drainage area values (TR-55); tailwater conditions, stage/discharge curve or table., stage/storage curve or table; hazard reach length and a description of present and future conditions within that length, dam breach analysis and hydrograph; outfall is analyzed and protected against erosion from pond exit to channel.
 - v) **Summary and Conclusions:** Summarize results of the analysis to include the size, soil and use of the contributing drainage area volume, elevation and release rate and velocities during the 2, 10 and 100 year storm event, results of a potential dam breach and a recommended maintenance schedule.
 - vi) **References:** List of all sources used to develop design, including design manuals, design standards, softwares, special equations, periodicals, specifications, etc.
 - vii) **Appendices** contains:
 - A) RCN computations (includes breakdown of soil/land use weighted RCN).
 - B) Tc computations (include slope computations, description of overland, channel characteristics, etc.).
 - C) Hydraulic (Weir, pipe, orifice, channel) equations and computations, charts or nomographs used for each structure feature (riser, barrel, emergency spillway).
 - D) Volume computations (contour/area/volume).
 - E) Supporting computations for all upstream ponds, structures, etc. if their storage effects are accounted for.
 - F) Tailwater/backwater computations (Mannings, HEC-2, storm drain, etc.) up to pond outfall, especially for ponds connected to storm drain systems.
 - G) **Soils Investigation:**
 1. 3 borings minimum, one each in area of centerline of dam, emergency spillway and in borrow area.
 2. Vicinity map showing soil boring locations.

3. Profile of borings with USC classifications.
 4. Determine bearing strength for soil under embankment.
 5. Determine maximum stable embankment fill slopes based on soil material used.
 6. Determine maximum stable cut slopes based on existing soil material.
 7. Determine seepage potential and method of protection.
 8. Determine pH embankment and core material.
- H) Drainage Area Map/Worksheet (on one map).
1. Contours at 5' intervals on 200 scale, or smaller.
 2. Drainage area and sub-area boundaries, TR-20 cross sections and structures clearly labeled and match the model, schematic and computations.
 3. Hydrologic soil group (A, B, C or D) boundaries are shown (delineated or hatched).
 4. Land use/cover boundaries (wood, ½ acre residential, grass, etc.) are shown (delineated or hatched).
 5. Topography extends at least 200' around D.A. boundary and extends through the hazard reach length downstream + 200' further.
 6. All/any existing ponds or other structures within the contributing drainage area are shown.
 7. Each sub-area shows the T_c path, clearly showing terminus points for overland (<200'), swale, gutter, channel and pipe flow lengths, all of which correspond to the T_c computations, all ending at a modeled cross section.
 8. Reach sections and T t paths shown, if modeled.
 9. Each sub-area is clearly labeled with the RCN and acreage.
 10. Title, name and number of site, scale and date.
- I) Copy of plan and profile of pond as they appear in the Construction Drawings. Legible reductions are acceptable.
- J) Computer output: TR-55, TR-20, HEC-2, HY-8, etc.
- K) Anti-seep collar design computations (L_s increased by 15%).
- L) Anti-flotation computations for riser base ($W_R & W_B \geq 1.2 W_F$).
- M) Computations for pipe gauge/wall thickness.
- viii) Report meets current TR-55 standards.
- ix) Report meets current TR-20 standards.
- x) Report meets current hydraulic computations standards for orifice, channel, weir and pipe flow.
- xi) Report is based on pond designed per MD-378 specifications.
- xii) No unapproved softwares used.

NOTE: The HSCD reserves the right to request any additional pond design data related to any of the items described on this checklist and the plans.

HSCD CRITERIA FOR POND CONSTRUCTION DRAWINGS

- I) **PLANS:**
- 1) Title (purpose), name, number, scale, date, P.E. seal & signature.
 - 2) Scale: 1" = 50' or less.
 - 3) Existing (faint but visible) and Proposed (heavy, standout) contours at 2' interval maximum; pond contours tie into existing round.
 - 4) Location of (3) soil borings (standard target symbol) at one each at the emergency spillway, centerline of dam and borrow area.

- 5) Inflow (swales, storm drain) and low flow channel shown and protected per current MDE Standards & Specs.
- 6) Riser, barrel (pipe), endwall, spillway, outlet, and emergency spillway shown.
- 7) Concentrated flow areas to receive rip-rap, gabion, matting or sod shown (protected per MDE/NRCS specifications).
- 8) Off-site topo (contours, buildings and roads, etc.) within 100' downstream of pond shown (MD-378).
- 9) County, State and Federal stream, wetland, building, etc. buffers shown.
- 10) Hazard class shown.
- 11) 100-year floodplain shown.
- 12) Breach floodplain shown (as required if hazard analysis dictates).
- 13) Seepage prevention structures shown (where required).
- 14) Wave protection shown (if needed).
- 15) Utilities (sewer, water, telephone, electric, gas, etc.) and appurtenances within 100' of pond are shown (underground and overhead).
- 16) Visual resources of pond and surroundings are appropriate (embankment blends into topog., pond edge is curvilinear, not rectangular).
- 17) No trees or shrubs are on embankment (usually shown on "Landscape Plan").
- 18) 50' radius around riser/inlet is clear.
- 19) Emergency Spillway:
 - A) Inlet channel curved and flared.
 - B) Side slopes 3:1 max.
 - C) Bottom width >8'.
 - D) Exit channel centerline is perpendicular to level section downstream edge, straight to beyond toe of dam.
 - E) Contour shows cut, no fill, i.e., in undisturbed earth, for entire length of emergency spillway.
 - F) Protection shown if velocities are high (see computations).
 - G) No fences, bridge, etc. in emergency spillway path.
 - H) Spot elevation on crest.
- 20) Erosion Sediment Control for pond during its construction is provided
- 21) Positive slope from back of pond and inflows to riser (normally dry ponds).
- 22) All existing ponds on site are shown and are either to be removed or reconstructed.
- 23) No created slope steeper than 2:1, no embankment slope steeper than 3:1.

II) **PROFILES:**

- 1) Title (purpose), name, number, scale, date, P.E. seal & signature.
 - 2) Vertical/Horizontal scales = 1/10 or multiple thereof, no smaller than 5" x 5", complete with axis, elevations and stations.
 - 3) Each profile has title which matches plan view section.
 - 4) Existing and proposed ground shown and tie into each other at both ends.
 - 5) Profile of soil boring project/overlaid on profile.
 - 6) Channel linings shown.
 - 7) All slopes, materials, and dimensions clearly labeled.
 - 8) 2, 10 and 100-year hydraulic gradients shown.
- i) Cross Section of Dam along Centerline:
- 1) Top of dam (settled).
 - 2) Constructed top-of-dam, delineated and labeled normally 10% of fill height.
 - 3) Location of Emergency & Principal Spillways.

- 4) Existing ground and proposed ground to both tie-in points.
- 5) Top and bottom of core trench shown extends to 10-year water elevation.
- 6) 2, 10 and 100-year water elevations delineated and labeled.
- 7) Freeboard is $\geq 1'$ with E.S., $\geq 2'$ without E.S.
- 8) Cutoff trench dimensioned 2' minimum below barrel.

ii) Cross Section of Emergency Spillway and "Token Spillways"
 [required if riser is ≤ 3 square feet (24" diameter) and D.A. ≥ 50 ac.]:

- 1) Design per Engineering Field Manual, Chapter 11, pp. 11-54.1 through 11-54.11 (check computations).
- 2) Protected soil (seed/mulch, sod, rip-rap, gabion) per velocities expected.
- 3) Located in natural ground (cut).
- 4) Side slopes, elevation of crest, existing & proposed ground tie-in points.
- 5) Bottom width $\geq 8'$.
- 6) Depth $\geq 2'$.
- 7) 100-year pond elevation shown.
- 8) Token spillway.
 - A) Crest elevation ≥ 100 year elevation.
 - B) Depth $\geq 1'$.
- 9) Meets NRCS Code 378 criteria.

iii) Profile of Emergency Spillway:

- 1) Existing and proposed ground between tie-in points.
- 2) Routed 10-year storm is at or below weir crest.
- 3) Invert of spillway shown and labeled.
- 4) Length of level section $\geq 25'$ R 0% slope.
- 5) Inlet slope and outlet slope per EFM.
- 6) Outflow channel protection shown and dimensioned.
- 7) Excavated Pond.
 - A) Unrouted 10-year storm is $\geq 1'$ below top-of-dam.
 - B) Routed 100-year storm is at or below top-of-dam.

iv) Cross Section of Dam Through Principal Spillway:

1. Existing ground.
2. Proposed ground, between both tie-in-points.
 - A) Slopes of dam sides (3:1 or flatter).
 - B) Top width (per Table 2, Code 378), 16' min. for One-way rd, 26' min. for two-way road.
 - C) Back and bottom of pond.
3. Cutoff trench.
 - A) Bottom width $\geq 4'$.
 - B) Side slopes 1:1 or less.
 - C) Depth into original ground to impervious layer, $\geq 4'$
 - D) Specify GC, SC, CH or CL soil for core material.
4. Impervious Core
 - A) Top width.
 - B) Side slopes.
 - C) Height.

5. 4:1 phreatic line shown from 10-year water elevation (100-year elevation if no E.S. is provided) starting a upstream face of dam to intersection at bottom of barrel.
6. "Pump core trench dry if water is encountered before placement of material", note on profile if borings shown groundwater elevation above core trench bottom
7. "Constructed" height of dam.
8. 2, 10-year and 100-year pond elevations.
9. Dashed line showing E.S. crest elevation.
10. Riser (principal spillway):
 - A) Orifice types (low flow, 2 yr., 10-yr.) and their bottom elevations shown.
 - B) Weir crests elevation shown.
 - C) If no E.S. provided, all freeboard requirements for E.S. apply to the P.S.
 - D) Bottom elevation of inside riser.
 - E) Bottom of anti-float riser base.
 - F) Type of material, basic dimensions [gauges, thickness, see Details, section III (1)]. Concrete or BCCMP allowed only.
 - G) Show trash rack, to scale, as it is oriented on top of riser. Trash rack bottom must be clear barrel $\geq 6'$ and not protrude into fill.
 - H) Length of riser.
 - I) Diameter of riser.
 - J) Means to drain pond (low flow drain/valve).
 - K) No flat openings on top of riser, below 100-year pond elevation.
 - L) Crest is $\geq 1'$ below emergency spillway crest.
11. Barrel:
 - A) Inlet and outlet elevations.
 - B) Slope of pipe.
 - C) Pipe materials.
 - a) Concrete must specify ASTM C-361.
 - b) Concrete must show concrete cradle.
 - c) BCCMP must be used instead of CMP.
 - d) 16 gauge minimum allowed for BCCMP but see Table 3 & 4 for ill vs. gauge requirements.
 - e) Corrugation size (cathodic protection provided for soil with $R \geq 4000$ ohms/cm or $pH \geq 5$).
 - f) See Code 378 for additional material specifications.
 - D) Pipe diameter shown and $\geq 6'$ (must be circular).
 - E) Pipe length shown (or stationing).
 - F) Anti-seep collars or filter and drainage diaphragm
 - a) (Five times projection) \geq spacing \geq (fourteen times projection).
 - b) At least one, but preferable all collars in saturation zone.
 - c) Collar has minimum 2' projection.
 - d) Location of collars from riser (or stationing).
 - e) Material is same as barrel pipe.
 - G) If double barrel, barrels are $\frac{1}{2}$ x diameter apart or 2', whichever is greater.
 - H) Endwall section is same material as barrel pipe.

12. Outfall:

- A) Profile of ground is shown to at least 100' below outlet of spillway.
- B) Outfall protection (rip-rap) filter cloth, size d_{50} or classification), depth ($2.25 \times d_{50}$) and length shown.
- C) Standard note for easements or rights of discharge.
- D) Q_{10} , V_{10} , d_{10} , V_{100}

III) **DETAILS:**

1. Riser:

- A) Thickness of walls and top
- B) Orifice location and size
- C) $\geq 9"$ depth of embedding into base
- D) Reinforcing spacing
- E) 2, 10 & 100-year pond elevations shown
- F) Drain pipe configuration

2. Anti-seep collars:

- A) Same material as barrel, specify placement at least 2' from closest joint

3. Trash rack:

A) Principal Spillway:

- a) Hood type (flow is underneath trash rack)
 - i) Diameter (or length/width) & height & depth of top & bottom from weir crest.
 - ii) Anchored to riser
 - iii) Includes anti-vortex device
 - iv) Openings (spacings of bars): $6" \leq \frac{1}{2}$ barrel diameter
- b) Solid type:
 - i) 100-year stays below bottom of solid cover top (Weir flow)
 - ii) If above the bottom of solid cover top then Barrel must be controlling flow (see computations)

B) Low Flow:

- a) Openings are $\leq \frac{1}{2}$ orifice diameter
- b) Number of openings totals to \geq six times the orifice area
- c) Designed to shed floating or settling debris
- d) Anchored to riser or ground

4) Outfall Protection Apron:

- A) Length & depth shown
- B) Filter cloth between all stone/earth interface

5) Channel Section:

- A) Into pond
- B) Through pond
- C) Beyond pond outfall

6) BCCMP Coupling Bands:

- A) Water tight seal with gaskets (see 378-13 for allowable types)
- B) Dimple bands not allowed

7) Endwall Section:

- A) Same material as barrel

8) Anti-flotation riser base: 18" min. thickness, 2-8# rebar anchor, width at least two times the raiser diameter, $\geq 9"$ embedded into base

- 9) Gabion dimension, materials, and specifications
- 10) Concrete cradle for RCCP, extends at least 10% of outside diameter, 3" minimum
- 11) Utilities anti-seep collars, (if applicable), I.D. is ≥ 1.25 inches
- 12) Seepage control for embankments
- 13) Miscellaneous special design features
- 14) Method and instructions for plug or dewatering device during E/S control

IV) **NOTES:**

- 1) "Pond Construction Specifications" (copy of Code 378 Construction Specs)
- 2) "Sequence of Construction" address pond construction (usually early for use during E/S control)
- 3) Hazard Classification on plan view
- 4) NRCS signature block for ponds on all applicable sheets
- 5) HSCD signature block on all applicable sheets
- 6) Owner's/Developer's Certificate (references As-Built required and HSCD inspection)
- 7) Engineer's Certificate (references As-Built)

EROSION/SEDIMENT CONTROL:

See "HSCD Criteria For Erosion and Sediment Control Plan Preparation"